BeAGLE Update

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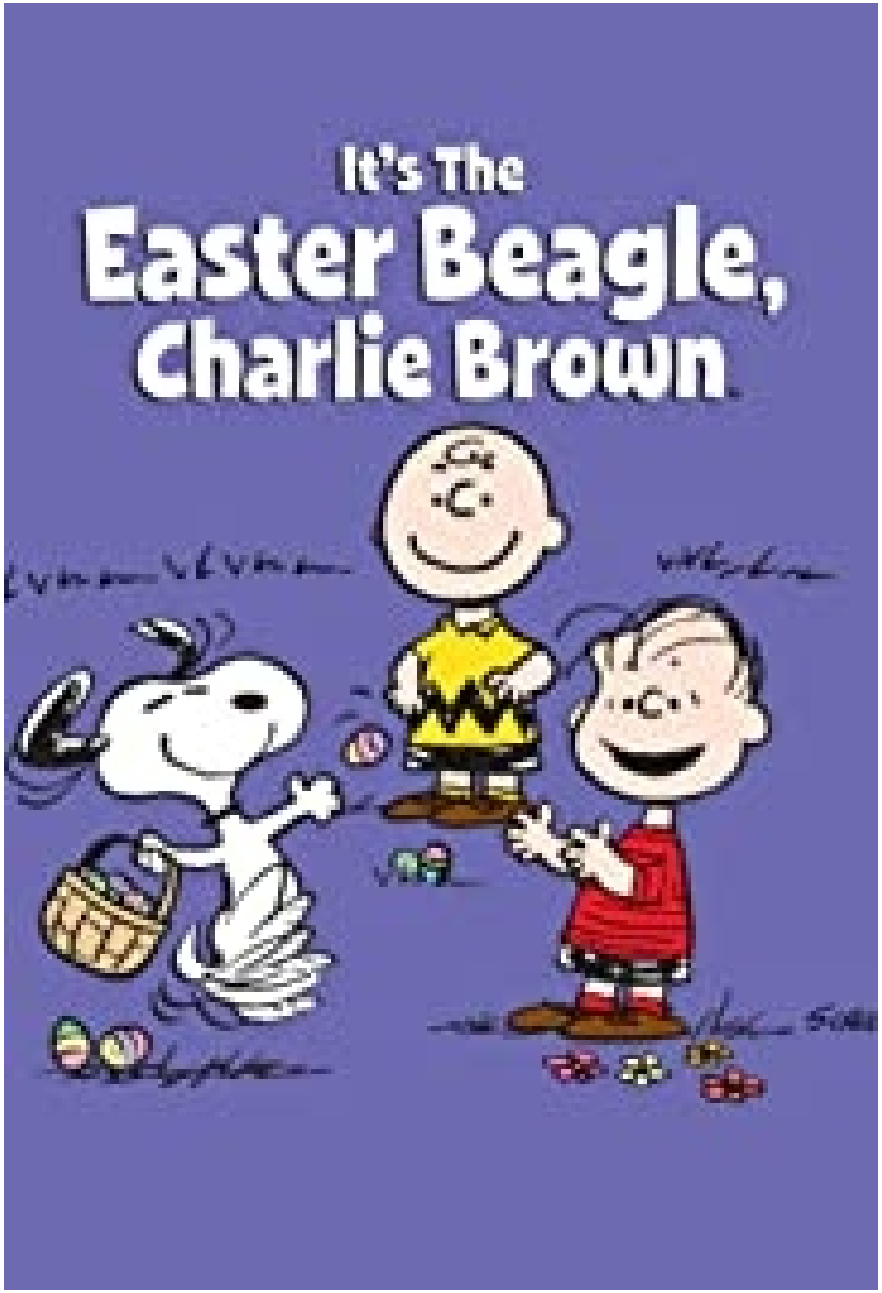
BeAGLE 1.1 (v1.01.00)

Diffraction fraction & τ_0 fit

BeAGLE 1.1 (v1.01.01) released 04-APR



Git repository up to date

/cvmfs/ (Kolja) .exe:
Up to date

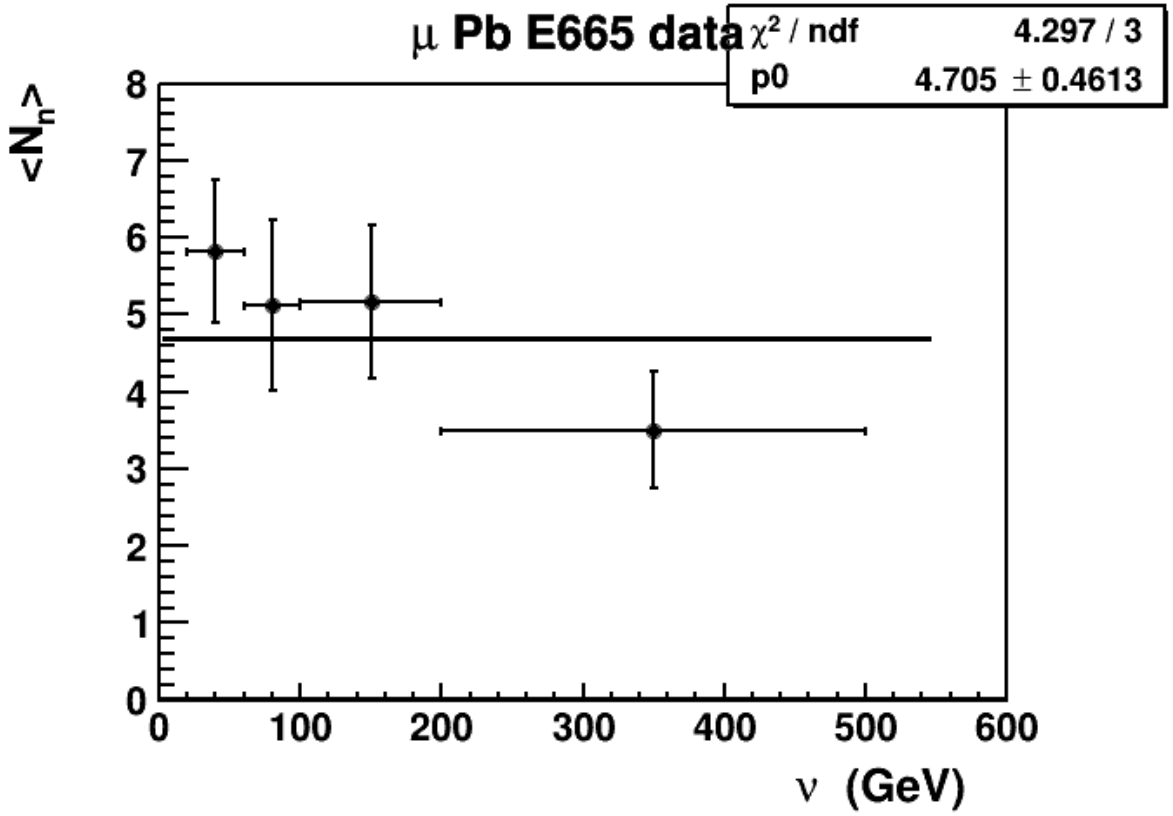
BNL /afs/ .exe:
Up to date

JLAB /u/group/ldgeom/:
Up to date

BeAGLE 1.1 – changes since 1.0 (05/2020)

- "Fermi skin correction" bug fixed. 4-momentum usually conserved now.
  - Tagged v1.00.01 (1.0.1) just before this bugfix.
- Improved handling of deuteron kinematics
  - 4-momentum conserved without distorting the momentum of the spectator nucleon.
- Random seed fixed (Thanks Barak)
- Partial fixes for A=3.
- Allow GEANT PID for nuclei (thanks Alex)
- Allow GCF-QE as input.

E665 neutron data



Coherent diffraction events (CD) have Nn=0.

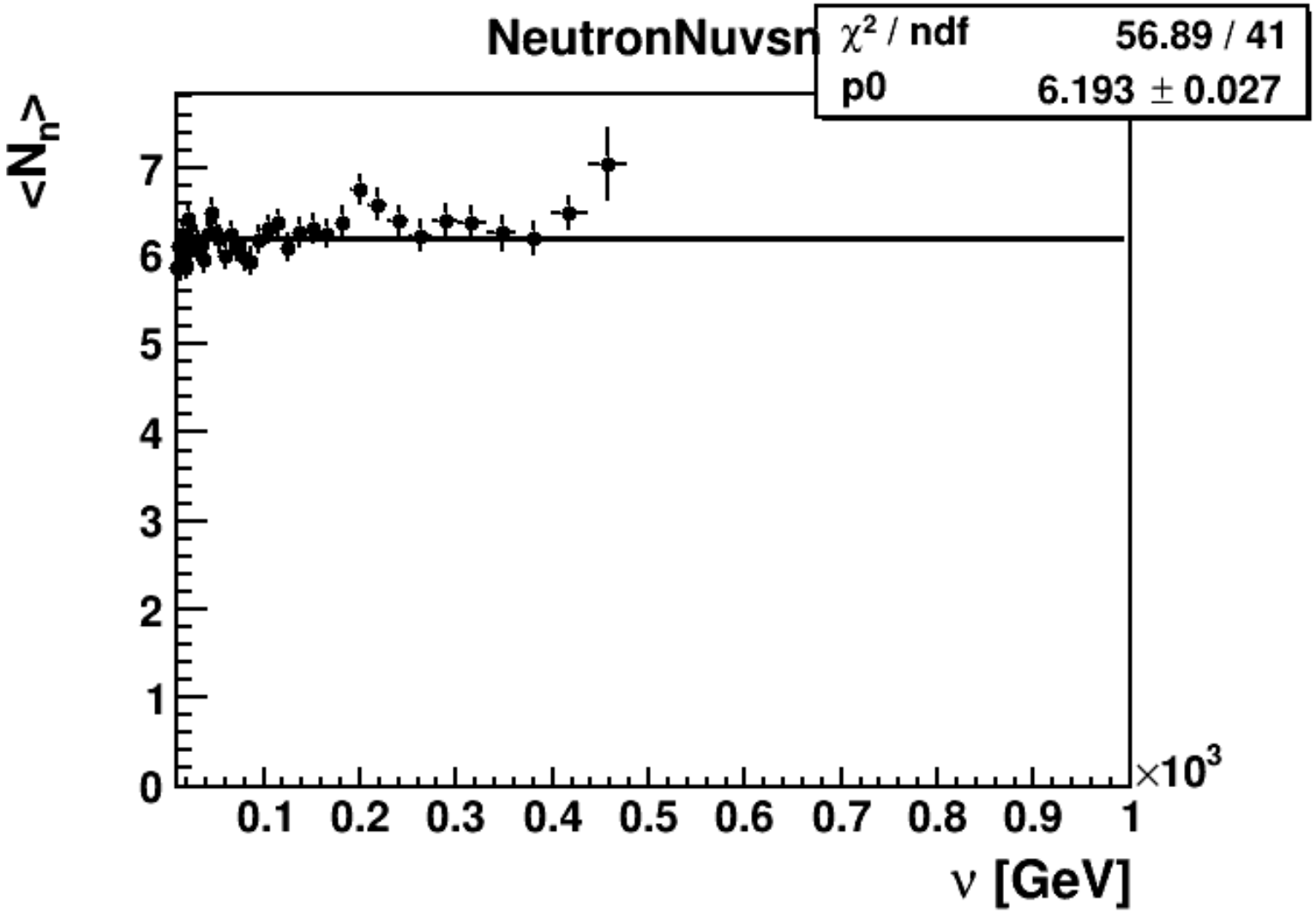
So to tune BeAGLE we need to estimate a reasonable range of f=CD/total in the E665 data.

Must be between 0<f<0.5.

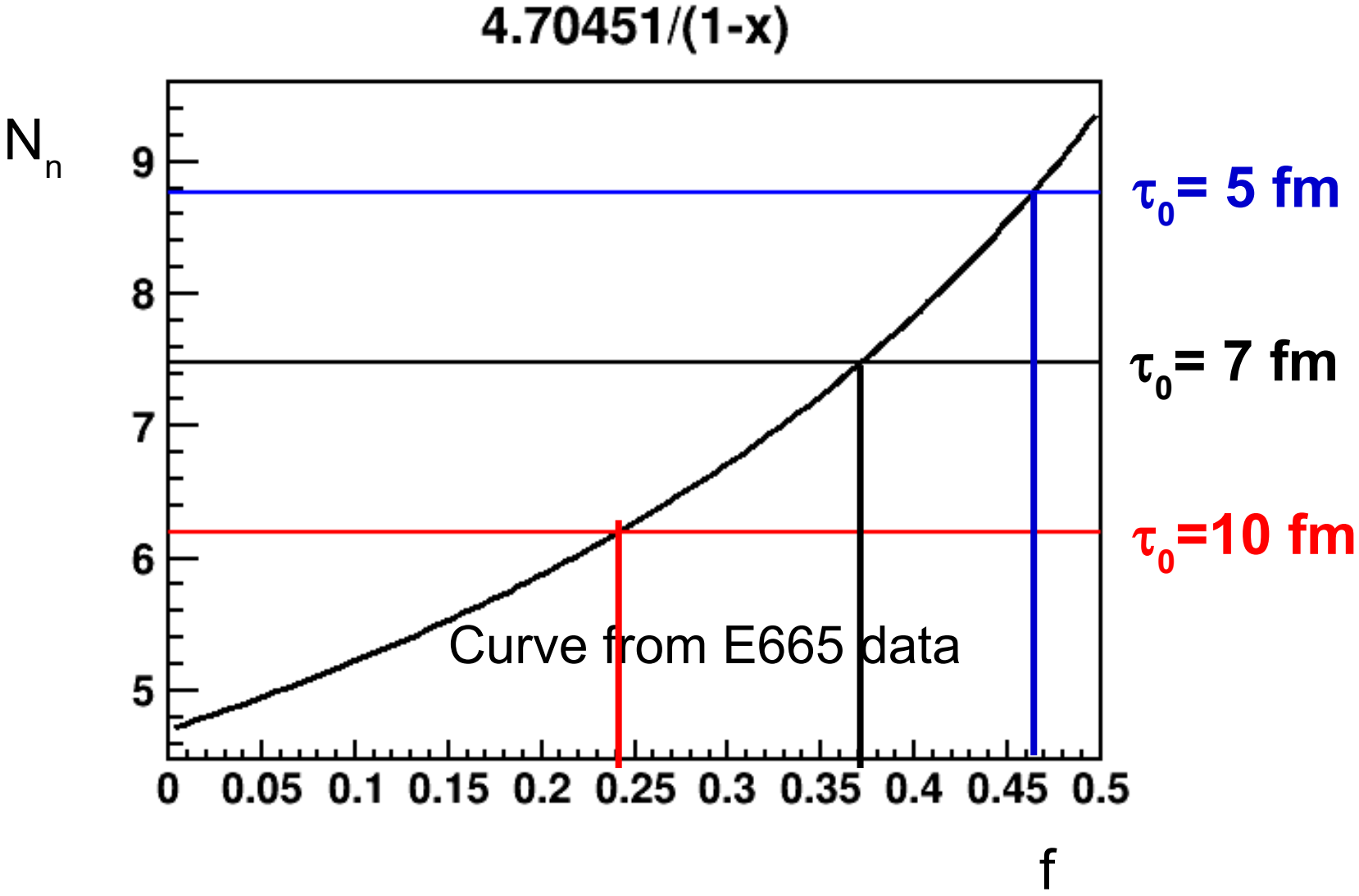
$N_n(E665) = 0*f + N_n(BeAGLE)*(1-f)$

$N_n(BeAGLE) = N_n(E665)/(1-f)$

Example plot from Wan Chang for τ_0=10 fm



Best τ_0 depends on our idea of f=CD/total



Note: We can interpolate. τ_0 vs. f is almost linear.

Original logic for f – not quite paper quality.

- Mark's crude idea:
  - CD/total = f ~10% for ep
  - E665 paper says $f_{Xe}=2\ f_p$ so 20%?
  - Supposed to go like $A^{4/3}$ for large A so fPb = $(208/131)^{4/3} * 20\% = 37\%$
- Elke's response. Too high. Can't be more than 30%. Probably lower.
- So we guess. Minimum f=0. Maximum f=0.3. "Best guess f" = 0.15

So how do we guess a range for f?

- 0 – 0.5 is unassailable, but seems absurd.
- Yellow Report has a discussion in section 7.3.2
  - "Diffraction in e+A is a poorly studied subject, in particular inclusive diffraction, which has never been measured."
  - If I read it right, some saturation-based models predict as high as 30-40%.
  - Some recent leading twist shadowing calculations result in smaller fractions (value not specified). Didn't have time to look into the paper yet.
  - Take these as the two extremes?

Comments

- Probably need one more higher τ_0. Then can interpolate based on f.
- Can we fit Ca as well as Pb?
- Don't understand 2 vs. 3.
  - If just 2 extremes, we need a band or 2 plots for EVERYTHING.
  - With 3, you can make one central plot and then just use the band for the most critical ones.
- How should we converge?